

A PRELIMINARY REPORT OF DUSTING FOR CONTROL¹

The traction duster has been used the past season in an attempt to control the grape leaf hopper. A 2% nicotine dust was used with both Bordeaux and lime. Applications on different plots varied at the rate of from 20 to 75 pounds per acre and it was only at the rate of 60 pounds per acre or more that a decided killing of both adult and nymphal stages was secured. Scarcely a live hopper could be found in some plots and dead leaf hoppers were observed in great abundance under the vines. On other plots treated on the following evening with apparently the same material and the same amount there was only a small per cent of killing. For this reason it is very hard to state what condition caused the killing. The different results obtained may be due entirely to the temperature and humidity conditions and there may have been a difference in the percentage of nicotine in the mixture.

Although a large amount of experimentation will be necessary to determine the conditions of killing, the interesting fact is that an economic control has been obtained by the dust on some plots.

PRESIDENT GEORGE A. DEAN. The next paper is "Derris as a Promising Insecticide," by R. W. Wells, F. C. Bishopp, and E. W. Laake.

DERRIS AS A PROMISING INSECTICIDE²

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There is a distinct demand for an insecticide for use on domestic animals which can be applied in the dry or dust form and be depended upon to give satisfactory control. This is especially true in regard to the control of lice on live stock. The various species of lice seldom become sufficiently numerous to be of marked importance as parasites, except during the winter when the conditions are least favorable for the application of liquids. In an effort to meet this need the authors and their associates have tested a considerable number of dry insecticides under varying conditions and against various external parasites. Among the substances tested was powdered derris. The insecticidal properties of this material were brought to the attention of American entomologists by Messrs. N. E. McIndoo, A. F. Sievers, and W. S. Abbott.³ As shown by these authors this material has some promise both as a contact and as a stomach poison for insects.

¹All materials used in the trial were furnished by the Niagara Sprayer Co. through the kindness of Mr. F. J. Sutton.

²Published by permission of the Chief of the Bureau of Entomology.

³Derris as an insecticide, *Journal of Agr. Research*, vol. 17, No 5, pp. 177—200, August 15, 1919.

In our tests of the substance when applied externally on animals and fowls we have seen no indication of any poisonous effects to the host. It is also stated that in factories where the roots are being powdered the employees become covered with the dust and experience no ill effects whatever. It is certain, however, that with a material so toxic it is necessary to proceed rather cautiously until we know more about its effects on the higher animals and man.

The powdered derris roots used in our tests were kindly furnished by the Tobacco By-Products & Chemical Corporation, and is supposed to be from *Deguelia (Derris) elliptica*.

EXPERIMENTS WITH DERRIS AGAINST MALLOPHAGA

In our tests of this material against Mallophaga we treated chickens infested with seven species of lice and cattle infested with the common biting louse of that host (*Trichodectes scalaris*). Where chickens were rather thoroughly dusted with derris the lice were very quickly destroyed, practically all of them being dead the day following treatment. Subsequent examinations extending over a period of six weeks showed no live lice present, thus indicating that the eggs were killed or the young lice destroyed upon hatching. Derris was also tested in suspension in water by Mr. H. P. Wood. Over forty fowls were dipped in a bath containing one-fourth ounce of powdered derris to one gallon of water. Subsequent examinations showed that a few lice were still present on the first and second day after treatment but soon after this all live lice disappeared and none were found on several subsequent examinations. In another test derris was used at the rate of one ounce to three gallons of water. Two and one-half hours after dipping some dead lice were found but a few living ones were present for about two weeks, when all disappeared.

DERRIS AGAINST THE COMMON BITING LOUSE OF CATTLE

A number of experiments were carried out with the dusting of cattle with derris diluted with various amounts of carriers. In the preliminary experiments at Dallas, in which the authors were assisted by Mr. H. P. Wood and Mr. E. E. Wehr, the results against this species were not very satisfactory, but these rather indifferent results were chargeable in a measure to the fact that the calves were not thoroughly dusted. In one test three heavily infested animals were treated with derris and tobacco dust, equal parts, the latter containing about .1% nicotine. The material was applied at the rate of 12.3 grams per animal with a dust can. On the following day all but a few scattered lice were dead. Subsequent examinations showed the presence of a few live nymphs only, thus indicating that probably all adults were destroyed but some

of the eggs escaped destruction. Unsatisfactory results were secured with the use of 8.6 grams per animal of derris and tobacco dust (one to ten) on four other hosts. Five heavily infested calves were treated by dust gun with 3.5 grams per animal of derris and wheat flour (one to three). Four days later a few living lice in all stages were still present. Derris and flour in proportion of one to five was applied with a dust gun on seven additional calves on Feb. 14, the infestation ranging from light to heavy. The final examination of these animals was made on March 9. Four of them appeared to have all lice destroyed while two showed a very few living lice and one a moderate number.

Three animals were treated Feb. 14 and 15 with derris and flour (one to twenty) applied with a shaker can. About one ounce of the mixture was used per animal. On March 9, one of these was completely free of living lice and a few were present on the other two. Five animals were dusted with a hand atomizer on Feb. 14 and 15, using derris and flour in proportion of one to ten, 16.2 grams per animal. On Feb. 16 very few live *T. scalaris* were observed and on March 1 and 9 but a single immature specimen was found alive.

Owing to the fact that sodium fluoride has been shown by us to be very effective against *T. scalaris* when applied in the dust form, and with a view to developing a powder which would be one hundred percent efficient against all lice on cattle, a mixture of equal parts of derris and sodium fluoride was dusted with a gun on 16 calves and yearlings on Feb. 24. About one and three-sixteenths ounces were used per animal. On March 9 and on subsequent dates not a single live louse could be found upon thorough examination.

On May 18, 1920, two calves which were heavily infested with *T. scalaris* were treated at Lafayette, Indiana, with pure derris powder, one ounce per animal applied with a dust gun. All lice were observed to be dead on May 22 and the eggs were apparently killed. On June 5 no living lice were found and all of the eggs appeared to be dead and collapsed. Three other moderately infested calves were treated by shaker can with derris and flour, equal parts. Two received one ounce each and the other one and one-half ounces. Four days after treatment all lice and eggs were apparently killed, and on June 5 not a living specimen was found.

USE OF DERRIS AGAINST ANAPLURA

The use of derris has been given a fairly extensive test against two of the common sucking lice of cattle, namely *Linognathus vituli* L. and *Solenopotes capillatus* End.

On Feb. 15, 1921, seven calves, most of which were heavily infested with *L. vituli*, were treated. Two of these received derris and flour

one to five, one ounce per animal applied with a gun. Three received derris and flour one to ten, 16.2 grams per animal applied with a gun, and two derris and flour one to twenty, 28.75 grams per animal applied with shaker can. These calves, with the exception of one treated with the 1 to 10 mixture, were examined on Feb. 24. All of the lice were killed on the animals treated with the 1 to 10 and only a few were found on one of those treated with the 1 to 20 mixture. All of the others had a few living specimens present although some of them were weak. On Feb. 24, 1921, 16 calves, most of which were lightly infested with *L. vituli*, were treated with sodium fluoride¹ and derris equal parts with a gun. On March 9 and subsequent dates not a living louse could be found and the eggs were collapsed. At Lafayette, Ind. two heavily infested calves were dusted with pure derris and three with equal parts derris and flour, applied with a shaker about one ounce of powder per animal. Examinations made four and eighteen days later showed no live lice and all eggs collapsed.

On Feb. 14, 1921, two calves with a moderate infestation of *S. capillatus* were dusted with one ounce of a mixture of derris and flour, one to five, with a dust gun. Two days later one of these showed a few alive and the other about fifty percent killed. On March 1, both were apparently free from lice and all of the eggs appeared to have hatched or collapsed. On March 9, however, a group of lice was found near one of the ears. On Feb. 14, a calf was treated with one ounce of derris and flour, one to twenty with a shaker can. Two days later no live lice were found and examination on March 1 showed no living specimens, but several were found to be alive when the animal was examined on March 9. Six calves, each with a light infestation of *S. capillatus*, were treated on Feb. 14 with derris and flour, one to ten, 16.2 grams per host with a dust gun. On March 1, only two living specimens could be found, and on March 9 no adults were present, but several half grown lice were seen. A cow showing a heavy infestation of this species was thoroughly treated with derris and flour in equal parts by means of a shaker on March 1, one and three-fourth ounces of the mixture being used. On March 9 a thorough examination indicated that the lice were completely destroyed. All eggs were either hatched or collapsed.

All of the calves in these tests were associated with other animals and the re-occurrence of specimens in some cases indicates that the animal may have been reinfested from other stock.

A test with derris and flour one to one was made on a dog heavily infested with the sucking louse, *Linognathus setosus* Olfers. The animal was given a thorough treatment with one ounce of the mixture with

¹Sodium fluoride has been found to have practically no effect on this species.

shaker can. Examinations two days after dusting and subsequently failed to reveal the presence of adults or young, thus indicating complete destruction. Three other infested dogs were dusted with much smaller amounts and all lice and eggs killed. The minimum amount tried on the above hosts was about two grams of a mixture of derris and corn starch (one to three).

PRELIMINARY TESTS WITH DERRIS AGAINST LARVAE OF HYPODERMA LINEATUM

A preliminary test of the use of an ointment consisting of one part derris to two parts vaseline applied to the holes of warbles in the backs of cattle indicates that this ointment is as effective as any other material used in this way. Five days after treatment all grubs were found to have been killed and the condition of the cysts was very satisfactory. A wash consisting of one pound derris, four ounces soap and one gallon water applied once with a brush to the backs of infested cattle killed practically all grubs.

USE OF DERRIS AGAINST FLEAS

Results from the use of derris against dog and cat fleas were surprising and extremely gratifying. A series of tests were carried out by Mr. H. P. Wood in a dog and cat hospital in Dallas. Dr. Allen Foster, the proprietor, very kindly cooperated in this work. Both dog and cat fleas (*Ctenocephalus canis* and *Ct. felis*) were present.

In the first test which was begun Oct. 28, 1918, three dogs were given a thorough treatment with undiluted derris with a dust gun. On the following day a single living flea was observed. On repeated examinations extending up to Nov. 10th no more living fleas were found despite the fact the dogs were associated with other infested individuals.

Four dogs of three breeds were given a thorough but rather light dusting with derris undiluted and no live fleas were found on them two days later.

A series of tests with several breeds of dogs indicated that the minimum dosage necessary to completely destroy all fleas was .87 grams of a mixture of equal parts derris and corn starch per animal. When the quantity of derris was reduced to .2 grams one hundred percent kill was not realized.

Following these preliminary experiments derris and corn starch in the proportion of 1 to 3 was applied to all of the animals in the hospital at the time—48 dogs and 9 cats. The material was put on along the back and neck of each animal with the thumb and finger. An average of slightly less than two grams per animal was applied. These animals were treated on Dec. 4 and subsequent examinations up to Dec. 10 showed no living fleas.

In order to determine the results of the use of derris on dogs which were not removed from their flea-infested quarters, treatment was begun on three heavily infested animals. Dust was applied on all parts of the animal at the rate of one-half to two and one-half grams. In the case of one of these dogs all fleas disappeared after the second application and none were found subsequently. Probably the cool weather of December held the breeding in check, however. In the other tests live fleas were found about a week after each treatment and the number gradually increased until the next application was made. Three treatments, however, reduced them to comparatively few and the tests were discontinued.

Several cats were treated with about three pinches of derris each. No injury whatever was observed to the hosts and the fleas were all destroyed, although where the cats had freedom some living fleas were picked up a few days after the application and apparently remained on the host.

In one test puppies rather heavily infested with the sticktight flea (*Echidnophaga gallinacea*) as well as the dog and cat fleas, were each treated with one gram of undiluted derris. In a few hours dead dog and cat fleas began dropping off the hosts and the following day all specimens were dead, though many sticktight remained attached.

SUMMARY AND CONCLUSIONS

Derris powder is satisfactory as a destroyer of Mallophaga on chickens and cattle, but apparently not quite as effective on the latter as sodium fluoride.

It is very effective against Anoplura on cattle and dogs, one treatment accomplishing the destruction of all stages.

The results of its use against fleas on dogs and cats are probably most striking, very small amounts being sufficient to destroy all fleas present.

It appears to be effective for lice and fleas when reduced with from one to ten parts of a carrier to one part of derris.

MR. H. A. GOSSARD: Where can we obtain derris commercially?

MR. F. C. BISHOPP: There is no commercial supply now available in this country, but I believe, with a demand for the product, that it will be put on the market. I understand that an English chemical company is now producing it in the East Indies, and furnishing it as an insecticide in South Africa. It is said that they are in position to supply a considerable quantity of it. I don't know that the supply